IDAHO DEPARTMENT OF FISH AND GAME

ANNUAL REPORT

CABINET GORGE HATCHERY

1992

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INTRODUCTION

Cabinet Gorge Hatchery is located in Bonner County, Idaho approximately eight miles southeast of the small community of Clark Fork. Constructed in 1985, the hatchery produces advanced-stage late-spawning kokanee salmon fry for Lake Pend Oreille (Table 1). These fry are needed to mitigate for the loss of wild kokanee recruitment caused by hydroelectric power projects on the Pend Oreille watershed. The hatchery also controls timing of the release of these fish to coincide with the altered cycles of zooplankton blooms in the lake caused by Mvais shrimp.

Staffing at the hatchery includes two permanent personnel, one temporary year-long maintenance craftsman, 8 months of bio-aide time, and another 17 months of temporary time. Housing accommodations include two residences for the permanent staff and crew quarters for two seasonal employees.

Water Supply

Cabinet Gorge Dam is located about one mile upstream from the hatchery. After its completion in 1952 and the resultant water level rise, artesian springs began appearing along the river at the present site of the hatchery. The hatchery utilizes these springs by pumping up to 20 cfs of water to the hatchery using six pumps in two well fields. The lower spring and upper well field vary inversely with each other over a 12-month period. A mixture of the two water sources allowed incubation water to be kept around 50°F (10°C) to promote feed training. Production water ranged from 41.0°F (5.0°C) to 53.6°F (12.0°C).

Rearing Facilities

Rearing facilities at the hatchery include 192 upwelling incubators measuring 12 inches in diameter and having a capacity of 130,000 eggs per incubator. There are 64 concrete raceways which have a rearing space of 32,000 cubic feet. Approximately one-third of the area of these is enclosed by the hatchery building. The adult holding area contains three holding ponds (10 ft x 30 ft each). A trapping area (10 ft x 20 ft) is provided at the head of the fish ladder. An extension joins a large holding pond where the fish are spawned. The area of this addition is 20 ft x 30 ft.

PRODUCTION

Between January 1, 1992 and December 31, 1992, Cabinet Gorge Hatchery released or had on hand a total of 6,180,723 fish weighing 31,819 pounds (Table 2). About 7,498,513 Lake Pend Oreille kokanee eggs and newly hatched fry were on hand December 31, 1992.

A total of 39,495 pounds of feed produced 31,819 pounds of gain for a conversion of 1.24 overall. Average cost per pound of feed was $0.49, resulting in a feed cost per pound of fish of $0.61. Total production cost (less capital outlay) was $211,341 (Table 2), resulting in a cost per pound of fish of $6.64 and $32.53 per thousand.

Pend Oreille Kokanee

Rearing

Fertilized eggs are brought to the hatchery and disinfected in 100 ppm Argentyne for 15 minutes, counted using the volumetric displacement method, then placed into vertical upwelling incubators and gently rolled until eye-up. At eye-up, the flow through the incubator is increased. Fry are allowed to swim out of the incubator into the raceway at 1,600 temperature units and start on feed at about 1,620 temperature units.

Kokanee are feed-trained at 50°F using Rangens soft-moist starter for two weeks and then a mix of starter and 1/32-inch pellet until they are about 1.5-inches in length. At this time the diet is switched to only Oregon Moist Pellet (OMP) IV. Feed size starts at 1/32-inch, then to 3/64-inch, and sometimes 1/16-inch, depending on size objectives. These size objectives have changed from about 1.3-inches when the hatchery began operating, to a present request of 2 inches at release. Consequently, the hatchery capacity number has been reduced to meet this request.

The limiting factor in fish growth here continues to be a lack of available warm water (50°F) during the production months. Although the upper well field can yield up to 20 cfs, it is too cold to be used alone, and warm water from the lower springs must be added to temper it. Unfortunately, only 4.4 cfs is available from the lower springs, and only 12.4 cfs can be backed up by the generator should a power failure occur.

Because egg collection lasts over two months and a cross-section of the run is required for each release strategy, growth rates need to be adjusted according to release timing. The growth rates of the early egg-takes are slowed by decreasing the water temperature and feeding rate. The late egg-takes are increased by raising the water temperature and feeding rate. By adjusting these parameters after the fry are feed-trained, a representative sample can be obtained from each egg-take, thus assuring optimum genetic diversity in each release.

A total of 5,584,914 kokanee fry were produced at an average length of 2.22 inches and an average weight of 308 fish per pound. These fish gained 18,153 pounds from 21,450 pounds of feed, resulting in a conversion rate of 1.25:1.0 (Table 3). Fish feed production cost was $0.614 per pound and $1.98 per thousand.

Survival of green eggs to feeding fry was estimated at 91.0% (1991, 90.0%). Survival from first feeding to release was estimated at 92.0% (1991, 94.6%), resulting in survival from green egg to release of 84.0 (1991, 86.9%)(Table 4).

Fish Marking

Both of the 1992 release groups had represented sample groups fin-clipped (Table 5). A total of 60,000 Clark Fork River released fish were marked with a left ventral fin clip, and 30,000 Sullivan Springs released fish were marked with an adipose fin clip. An additional 30,000 fish from the Sullivan Springs group were given a right ventral fin clip and raised on a "slow-growth" regime. The purpose of this was to determine if smaller fish return at a better rate and if larger fish at release mature earlier. These fin-clipped fish will also be used to estimate the rate of adult straying between the Clark Fork River returns and the Sullivan Spring returns.

Fish Liberations

During June 1992, 1,123,600 fish were liberated from Cabinet Gorge Hatchery into the Clark Fork River (Table 6). On June 30, 970,441 fish were released at Harbor Marina on Garfield Bay. In July, 3,421,145 were transported from Cabinet Gorge Hatchery to Sullivan Springs.

Numbers at release were based upon inventory numbers made just prior to moving the fish outside, minus mortality through release. All numbers were checked with a weight/sample count number as the fish were loaded onto the trucks except the hatchery ladder release. Our inventory numbers were below the weight/sample count numbers by about 9.1%, so we were confident that the actual number stocked is between these two numbers.

Kokanee in both releases were imprinted with morpholine at 5x10-5 ppm. The Clark Fork River release was imprinted for one month prior to release and two days after release, while the Sullivan Springs group was imprinted for six weeks prior to release and two days after release.

Clark Fork River-The hatchery release group of fry were flushed at dusk, using the fish by-pass system, directly into the ladder. Only three raceways were released at any one time to prevent fry from washing against the settling pond deflector screens before entering the by-pass pipe system. The entire release took less than two hours.

It was estimated that fry made it to the lake in two to three hours. Quick outmigration of kokanee fry is essential for the successful rehabilitation of kokanee for Cabinet Gorge Hatchery because of the predator trap in the Clark Fork River and delta area. To facilitate rapid outmigration, the Cabinet Gorge Dam provides flushing water in excess of normal power production.

Tanker Hauling-The Sullivan Springs release utilized the 10-wheel, 2,100-gallon Corps of Engineers tankers. Some modifications were made to the tankers for hauling small fish. The agitators were completely closed off to prevent trapping fish inside, and the sight tubes for water displacement readings were also removed. The lids were equipped with weather stripping for a tighter seal. Level lines and flood lines were screened to prevent fry from entering. Loading density of small fish in the tankers was kept below 0.60 pounds per gallon.

Sullivan Springs

Tanker access into Sullivan Springs is limited. Fish were planted below the bridge on the access road to the Idaho Department of Fish and Game patrol cabin. A 140-foot 10-inch flexible discharge hose was placed from the release area to the trucks to eliminate driving the trucks down the hill to unload. A collapsible hose was fastened at the bottom and functioned to slow the discharge velocity during planting. Prior to release, a tanker load of water was used to scour out a fry release pool. Two tankers made up to two trips per day for two and one-half consecutive days to complete the plant.

Other Fish Produced

Kokanee (1989 BY)

There were approximately 2,000 1989 kokanee remaining on December 31, 1992 following spawning. The remainder will be retained for egg production in 1993.

Kokanee (1990 BY)

About 34,000 kokanee averaging 7.92 inches were on hand December 31, 1992. These kokanee are being held as a captive broodstock to enhance declining kokanee populations in the lake. An additional 7,000 fish were received from the Sandpoint Hatchery to bolster the Cabinet Gorge population.

Kokanee (1991 BY)

Approximately 55,000 brood year 1991 kokanee averaging 4.42 inches were on hand December 31, 1992. These fish are being held as captive broodstock.

Deadwood Kokanee

About 4,008,123 eyed eggs from early-running kokanee from Deadwood Reservoir in central Idaho were received on September 6 to September 14, 1992. As of December 31, 1992, about 1,900,000 kokanee fry were on hand averaging 0.83 inches. These fish will be used for lowland lake stocking.

Gerrard Rainbow

It has been reported that the Gerrard Kamloops population in Lake Pend Oreille is only about 80% pure today because of matings with domestic rainbows and westslope cutthroat trout (Leery, personal communication). In an attempt to strengthen the genetic base and improve the trophy fishery, plus establish a non-captive, specific pathogen-free broodstock, hatchery personnel have been receiving Gerrard strain Kamloops eggs from Kootenay Trout Hatchery in Wardner, British Columbia, Canada since 1987. This has resulted in releases each year from 1988 to 1992.

These Kamloops eggs were divided into two groups: a "coolwater" and a "warmwater" group. The coolwater group, reared at the Sandpoint Hatchery, represents fish that achieve growth comparable to Gerrards in the wild. The other group is being reared on warmer water to achieve an earlier returning adult, thus providing eggs one year earlier than its wild counterpart. Until it is determined which release results in the most adults returning to the ladder, both groups will be used. A release of 9,344 brood year 1991 Gerrard strain rainbow trout was made from the Clark Fork River ladder June 11.

On March 23, about 15,200 F2 Gerrard strain eggs were received. Another 153,400 eyed eggs were received May 6. All Gerrard strain fish were transferred to the Hagerman and Nampa hatcheries prior to December 31, 1992.

Bull Trout

A bull trout program was established at Cabinet Gorge Hatchery in 1987 to advance the knowledge of bull trout culture and provide bull trout fingerlings to fisheries managers for reestablishment or enhancement of suppressed populations in Idaho. However, because of concerns about adversely affecting the genetics of the wild population in the lake with the introduction of hatchery fish from a limited number of parents, plus the unknown predator/prey relationship, this program was discontinued in 1991. However, bull trout from the 1990 egg take were still on hand as of December 31, 1992.

1990 Bull trout-On June 11, 5,055 brood year 1990 bull trout were stocked into the Clark Fork River. The remaining 7,888 were held for rearing to 10 inches or larger. These fish will be released in mountain lakes as a predator to reduce brook trout numbers in overcrowded lakes.

Westslope Cutthroat Trout

Genetically pure westslope cutthroat trout were reared and stocked into central Idaho lakes. Two thousand brood year 1990 trout were transferred to the Clark Fork Hatchery in March for broodstock.

Future rearing of westslope cutthroat will be accomplished at the Sandpoint Hatchery.

White Sturgeon

There were 172 white sturgeon on station January 1, 1992. These fish were reared until July, when 154 fish were transferred to the Kootenai Tribal Hatchery.

HATCHERY IMPROVEMENTS

A small metal storage shed was constructed to house lawn care equipment and flammables away from the hatchery building.

The foundation for a new spawning shelter was set in place at the Clark Fork River trap. This arched shelter will provide protection for both personnel and collected eggs during the November to January spawning season.

FISH HEALTH

Kokanee

Annual broodstock inspection of Sullivan Springs kokanee tested negative for all obligate pathogens (Table 7). These results are consistent with previous years' results from this egg source. Clark Fork River kokanee tested positive for Bacterial Kidney Disease in a carrier state. The captive broodstock tested positive for Coldwater Disease. Annual kokanee fry inspection tested negative for all pathogens examined.

Other Species

All eggs were certified disease-free or disinfected in Argentyne before entering the hatchery. If possible, other species were isolated from the Pend Oreille kokanee until released or until disease inspection had been completed. All intra-state programs were certified by the Eagle Fish Health Lab (Table 7). The Gerrard Kamloops and westslope cutthroat were examined by their respective agencies and certified "disease-free."

FISH SPAWNING

Fish Trapping

During 1992, the Cabinet Gorge fish trap was in operation from the middle of September to the last week of December. Kokanee began entering the trap at the end of October, with the last kokanee trapped and spawned on December 17. There were 22,875 fish trapped, including 4,055 females (17.7%).

The Sullivan Springs trap collected 83,739 fish, with 17,639 females (23.9%). Ten thousand of those fish were passed above the trap to spawn naturally.

Spawntaking and Eggs Received

Kokanee spawntaking began on November 2 and continued to December 23, 1992. All fish were spawned by December 17 at the Cabinet Gorge trap. Spawntaking was terminated at the Sullivan Springs trap after December 23 when high winds and blizzard conditions restricted access.

A total of 7,498,513 kokanee eggs were collected during the 1992-1993 production year. Of those, 1,373,342 (227,331 in 1991) were obtained from 4,055 female kokanee at Cabinet Gorge Hatchery, and 6,125,171 were collected from the Sullivan Springs trap. Another 1,054,758 eyed eggs were received from Colorado State in December 1992.

PUBLIC RELATIONS

Cabinet Gorge Hatchery is recognized by the surrounding communities as the major contributor of kokanee to the lake fishery. The importance of the lake fishery to the local economy is presently estimated at over 5 million dollars. Once the kokanee population rebounds, that figure should double. Many people see the hatchery as the "cure-all" to the kokanee decline in the lake. While this is not necessarily reality, the hatchery has been the focus of many radio, television, and newspaper stories in recent years. With the decline of kokanee numbers in recent years, even more attention is placed on the hatchery. Because of the popularity of the lake and its attractions, tourism is a booming business, and we get people from all over the world visiting the hatchery.

About 800 people signed our guest registration book this year. It was estimated that about 2,400 visitors toured the hatchery during the 1992 season. In addition, numerous tours were given to school groups and other organized groups. A federal program (JTPA) enabled us to provide a full-time tour guide for visitors.

In addition to the tours, several slide presentations and talks were given to various groups. We were on local/regional television programs, in the local newspapers many times, and our regional newsletter.

We participated in many regional activities. Some of these included sturgeon spawning, electrofishing the Pend Oreille River, fall trawling and zooplankton sampling with the research biologists, installation of the chinook trap on the Coeur d'Alene River and net pens in Lake Pend Oreille, and miscellaneous regional meetings.

ACKNOWLEDGMENTS

We would like to thank the Cabinet Gorge Dam personnel for their continued cooperation with hatchery operations. Thanks also to the Lake Pend Oreille Idaho Club and Regional Department personnel for their cooperation during the spawning season.

Table 1. Kokanee requested and produced.

Species & size	Production goal	Actual production	Percentage of goal achieved
Kokanee fry	15,000,000	5,584,914	37.2%

Table 2. Production summary, all species, 1991-1992.

pecies	Number	Pounds	Length	Fish/lb	Average feed cost/lb	Conver-sion	Produc-tion cost	Cost/lb of fish
PdO KL	5,584,914	18,153	2.20	308	0.52	1.22	171,105	9.74
Brood KL*	91,123	8,605	6.80	11	0.46	1.04	16,526	1.98
KE*	407,000	2,051	2.50	209	0.52	1.58	18,000	8.77
K2*	87,652	1,089	3.14	81	0.45	1.20	2,297	2.18
Bull trout	9,860	1,914	10.80	3	0.42	1.90	3,000	1.56
Sturgeon	174	7	6.00	24	0.42	2.60	413	93.75
Totals/ Average	6,180,723	31,819					211,341	6.64

*On hand December 31, 1992.

Table 3. Kokanee production summary, Cabinet Gorge Hatchery, 1992.

Strain	Number Produced	Pounds Produced	Number Per Pound	Feed Fed	Conversion
KE	427,907	2,051	208.6	3,235	1.58
KL	5,584,914	18,153	307.7	21,450	1.25
TOTAL	6,012,821	21,204	297.6	21,685	1.22

Table 4. Survival summary, Kokanee salmon, Cabinet Gorge Hatchery, 1991-92.

Lot #	Number Green Eggs	SURVIVAL		
		Green Egg to First Feeding	Green Egg to Release	Feeding fry to Release
CF	1,249,540	.94	.90	0.96
SS	4,197,044	.91	.83	0.90
GB	1,136,133	.87	.85	0.96
Total:	6,582,717	.91	.84	0.92

Table 5. Differential marks applied to different release groups of kokanee fry produced at Cabinet Gorge Hatchery, 1992.

Release date	Release site	# Fish released	Percent marked	Fin Clip		
				Ventral		
				Left	Right	Adipose
June 7	CFR-CG	1,123,600	5.3	a		
July 14/15	SS	3,421,145	0.9		b	
July 14/15	SS	same	0.9			c
Total		4,544,745				

a 60,000 marked
b 30,000 marked (slow growth group)
c 30,000 marked

Table 6. Kokanee liberation from Cabinet Gorge Hatchery, June-July 1992.

Date	Release site	# Fish Released	Time	Length inches	No./ lb
July 7	Clark Fork River	1,123,600	dusk	2.18	327.3
July 14/15	Sullivan Springs	3,421,145	day	2.27	283.5
June 30	Garfield Bay	970,441	day	2.05	394.5
TOTAL:	Pend Oreille Drainage	5,515,186		2.22	303.7

Table 7. Fish health summary, Cabinet Gorge Hatchery, 1991-92.**CABGORGE**

	Sample dates	VH	VP	VE	BK	BR	BF	BC	PW	PC
Adults										
SS kokanee	12-07-92	-	-	-	-	x	x	x	-	-
CF kokanee	12-07-92	-	-	-	+	x	x	-	-	-
Fry										
SS kokanee	4-23-92	-	-	x	-	x	x	-	x	x
CAN-K2	5-13-92	-	-	x	-	x	x	-	x	x
CG kokanee	4-09-92	-	-	x	-	x	x	-	x	x
SS kokanee	5-13-92	-	-	x	-	x	x	x	x	x
SS BY90 KL	9-22-92	-	-	x	-	x	x	x	x	x
SS BY89 KL	4-23-92	-	-	x	-	x	x	+	x	x
BY91 WS	4-23-92	-	-	x	-	x	x	x	x	x
BY90 BT	4-23-92	-	-	x	-	x	x	x	x	x
BY90 C2	5-13-92	-	-	x	-	x	x	x	x	x
Eyed Eggs Received										
Colorado KL	certified positive for BF and PW by Colorado Dept of Natural Resources.									

+ Positive results
- Negative results
x Not sampled

VH = IHNV, infectious hematopoietic necrosis virus
VP = IPNV, infectious pancreatic necrosis virus
VE = EIBS, erythrocytic inclusion body syndrome virus
BK = bacterial kidney disease
BR = enteric red mouth
BF = bacterial furunculosis
PW = whirling disease agent, Myxobolus (Myxosoma) cerebralis
PC = Ceratomyxa shasta, agent of ceratomyxosis

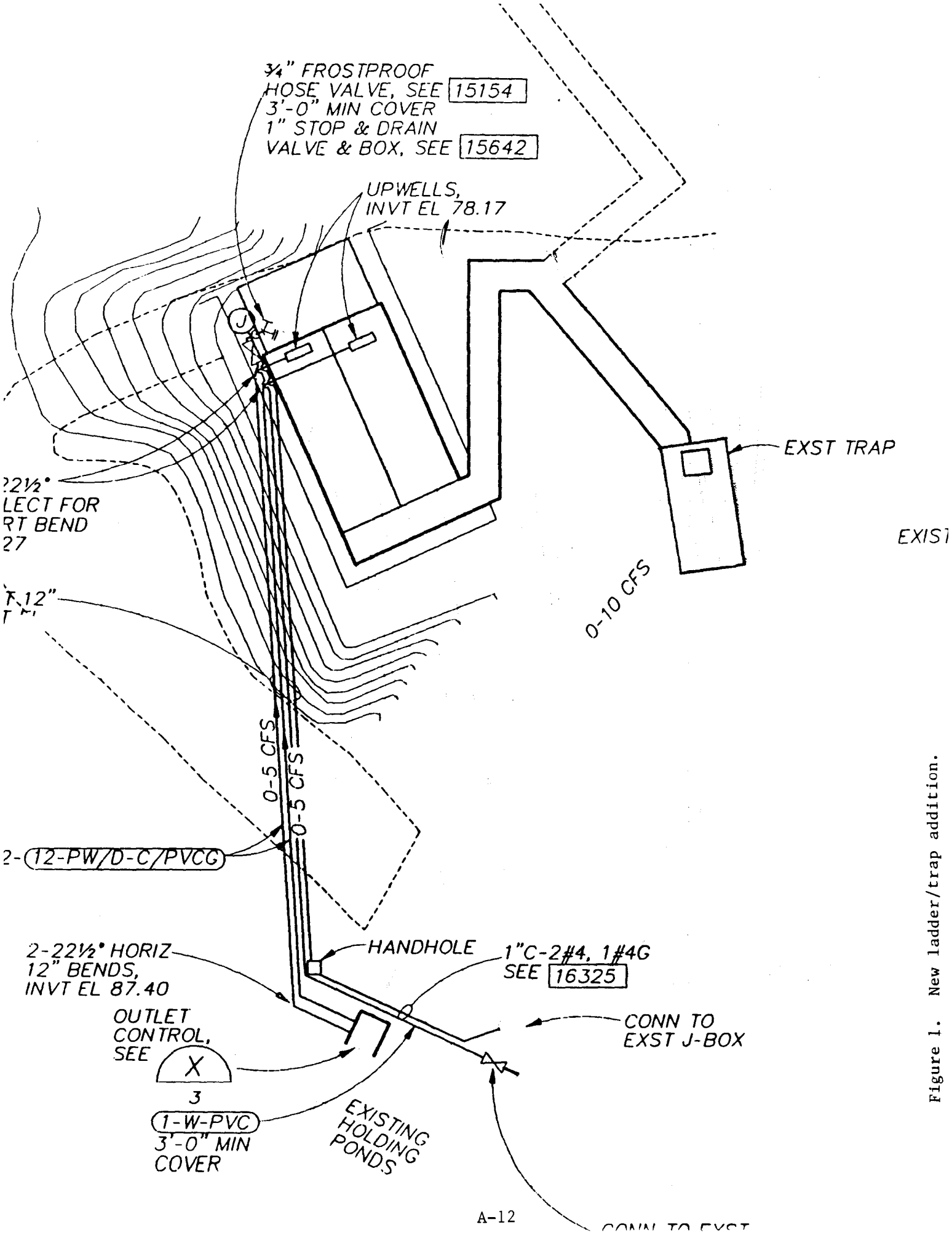
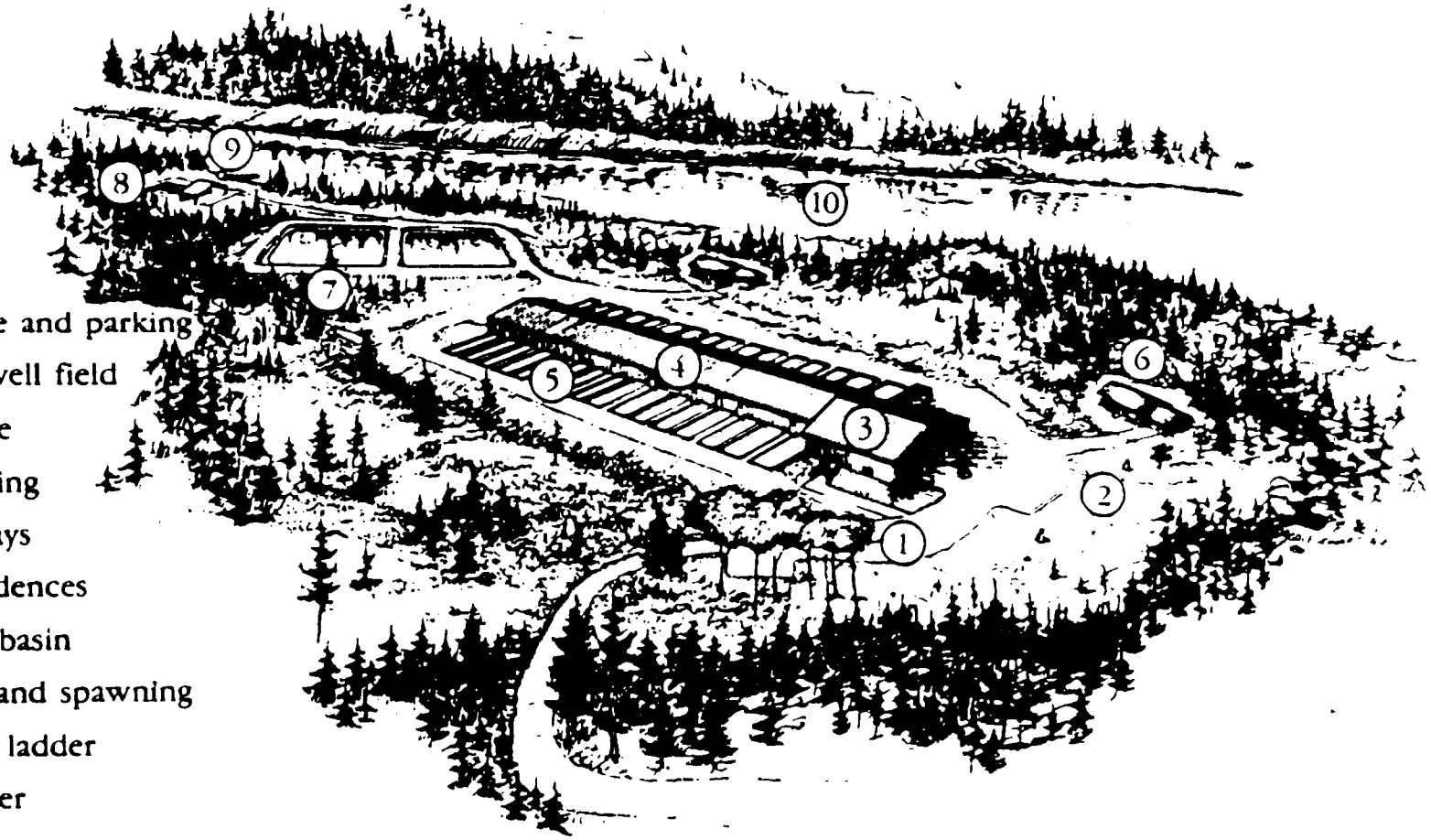


Figure 1. New ladder/trap addition.



1. Visitor entrance and parking
2. Water supply well field
3. Shop and office
4. Hatchery building
5. Outside raceways
6. Operator's residences
7. Sedimentation basin
8. Adult holding and spawning
9. Adult trap and ladder
10. Clark Fork River